A water policy and planning model for the Phoenix Metropolitan Area

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Introduction

The Decision Center for a Desert City (DCDC) supports and conducts climate, water, and decision research. We also develop innovative tools to bridge the boundary between scientists and decision makers in order to put our work into the hands of those whose concern is for the sustainable future of Greater Phoenix.

Our WaterSim water policy and management model represents one of the core tools created, updated, and maintained by DCDC. The newest version of WaterSim—WaterSim 5.0—represents a radical departure from previous versions. This version includes:

1) Demand-based modeling for 33 water providers (Figure 1)
2) Surface and groundwater (Figure 2)
3) Application Programmers Interface (API)- customizable (Figure 3)
4) A water supply and use (and re-use) network (Figure 4)

The program is Open Source; we supply code and documentation.

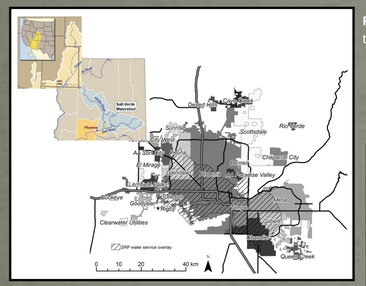


Figure 1. The geography of the WaterSm Model.

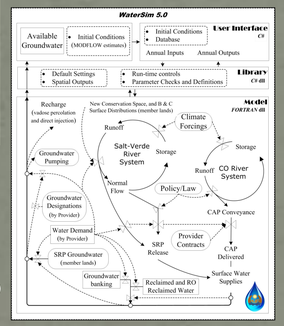


Figure 2. A diagram (representation) of the WaterSm Model.

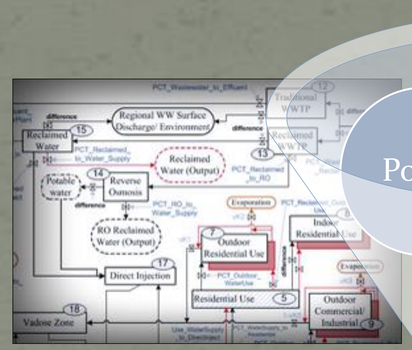


Figure 4. A schematic representation of the water supply and use network.

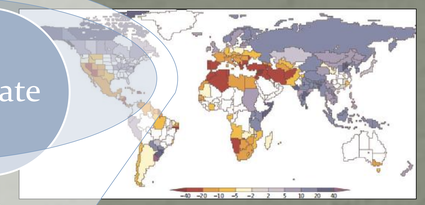


Figure 5. Projected changes in surface runoff (Milly et al. 2008).

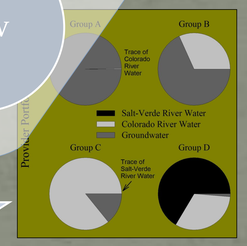


Figure 6. Legal rights to surface and groundwater.

Policy Decisions & climate/ runoff projections

SCENARIO GENERATOR

Outputs

Model Interface

Version 5.0 is written in Fortran, wrapped using C# libraries which include an application programmers interface (API) using a Windows dot Net platform.

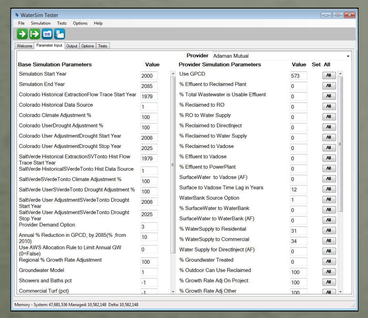
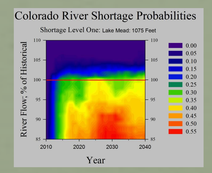
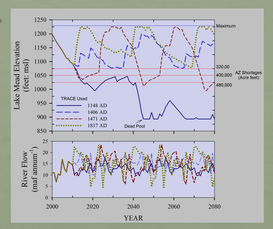


Figure 3. A screen shot of the application interface for the model. Simulation controls for inputs and outputs, and scenario generation are controlled through this interface. Users can also create their own interface.

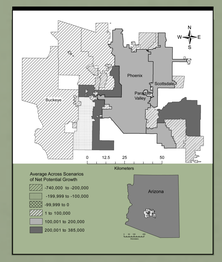
WaterSim is a hierarchical supply and demand budget model that uses supply from surface and groundwater sources and demand from residential, commercial, and industrial water users. It incorporates the rules that govern reservoirs, aquifer use, and land-use change. It simulates the urban water systems for Maricopa County and supplies that come from the Colorado River Basin and the Salt- Verde River basins

Riverine Dynamics

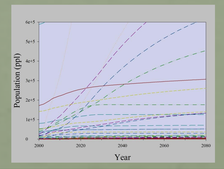




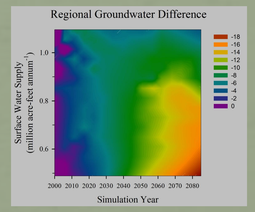
Growth Patterns



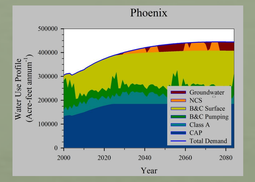
Population Dynamics



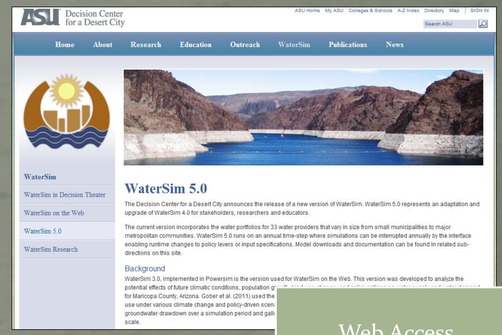
Groundwater Use



Provider Portfolios

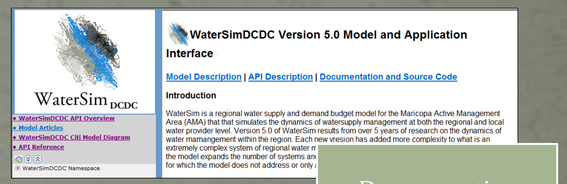


Access to the model



Web Access

http://dcdc.asu.edu/



Documentation

Summary

Educators, researchers, and water managers may download and use our sample interface, or they can develop their own using our API; they may create a custom interface to best suit their needs. Our WaterSim platform can be used to study how people make decisions under uncertainty. The model (framework) can also be used as a scenario generator; hundreds or thousands of scenarios can be generated. Model outputs may be analyzed at the water provider level or aggregated to the metropolitan level.

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For further information

Please contact david.a.sampson@asu.edu or ray.quay@asu.edu. More information on this and related projects can be found at http://dcdc.asu.edu/watersim